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[TRANSACTIONS OF THE AMERICAN INSTITUTE OF MINING ENGINEERS.]

SILVER ISLET:

BY

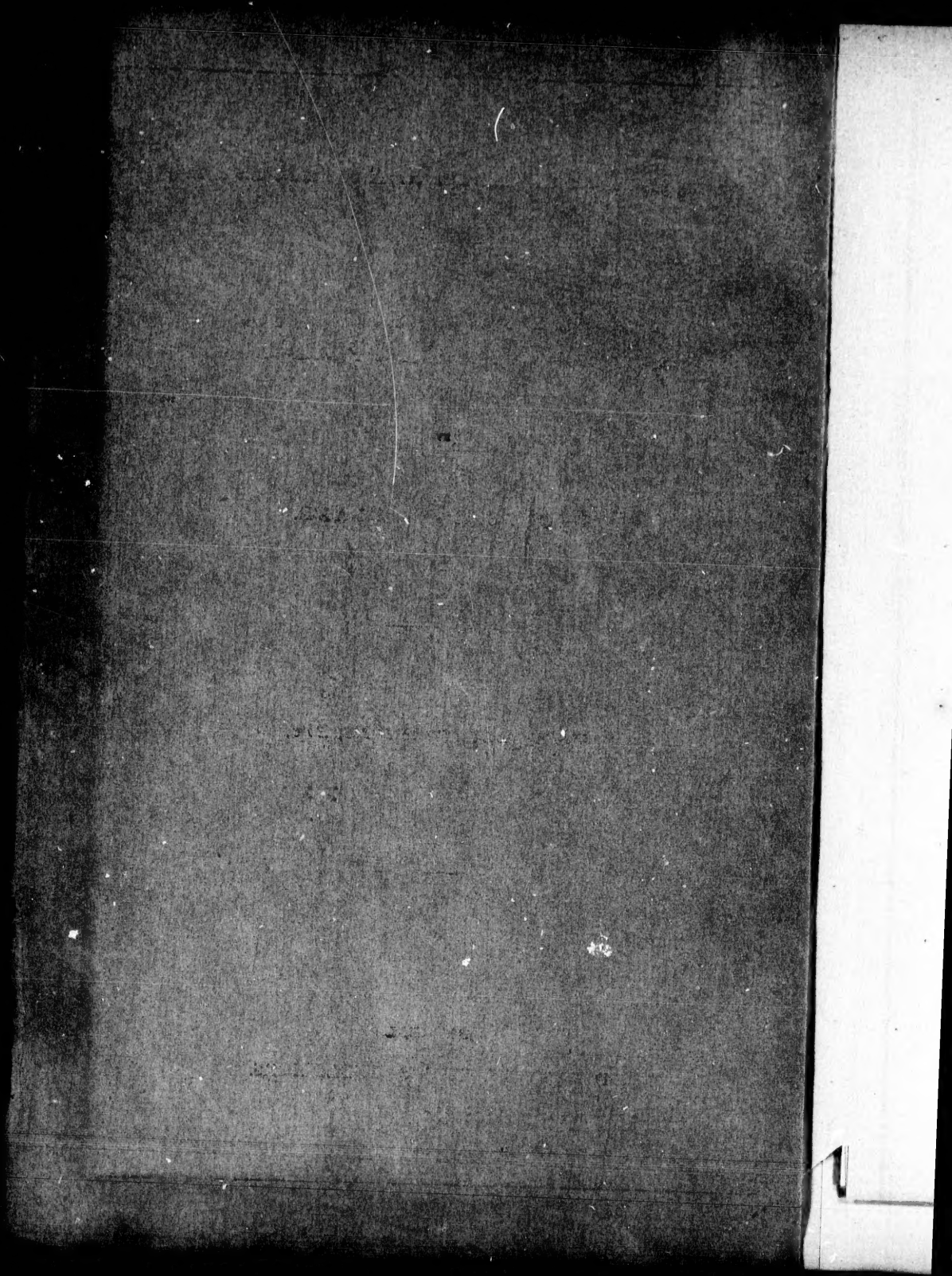
THOMAS MACFARLANE.

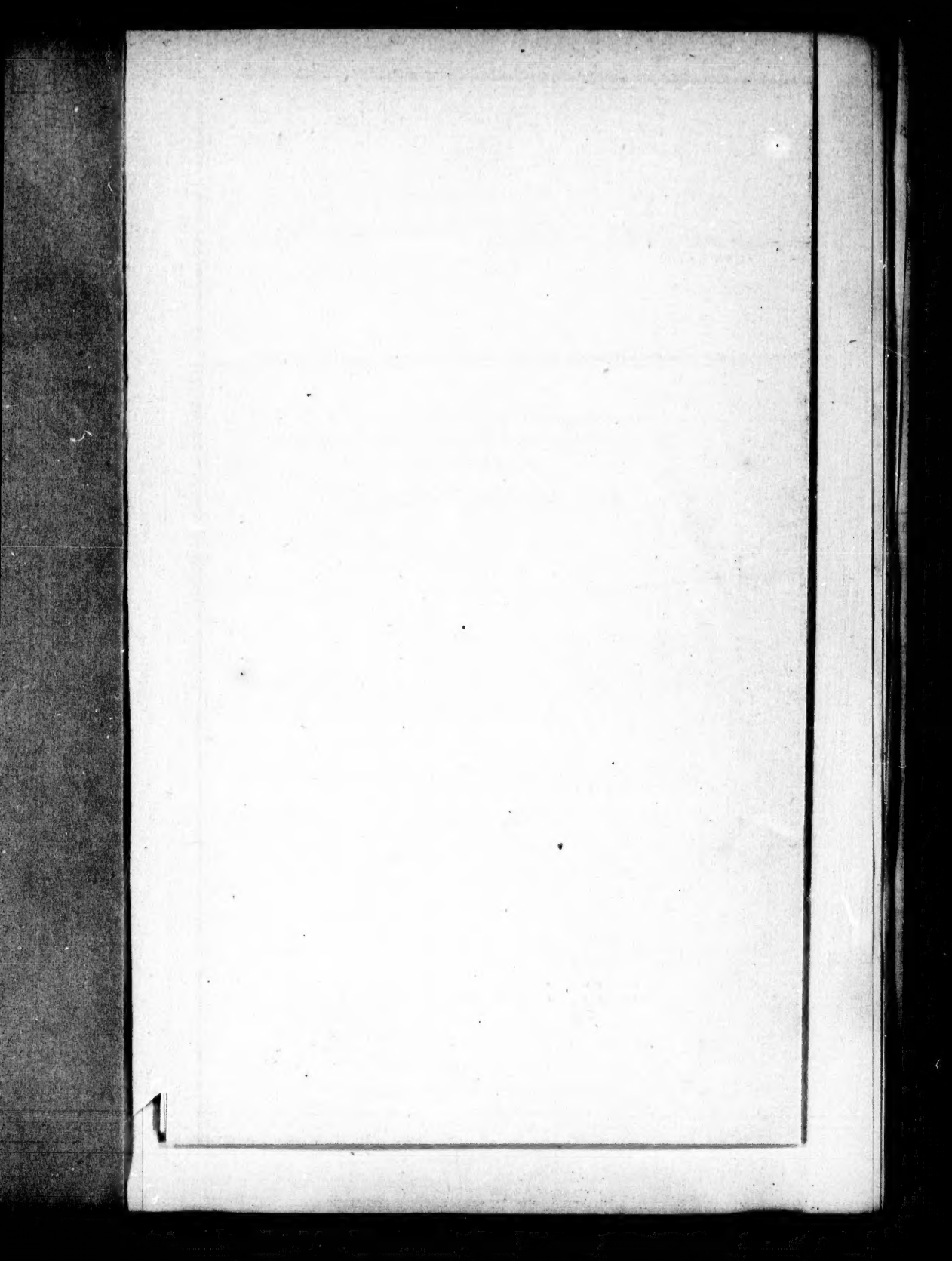
WITH ILLUSTRATIONS, ETC.

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1880.





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SILVER ISLET.

BY THOMAS MACFARLANE, ACTONVALE, QUEBEC, CANADA.

(Read at the Montreal Meeting, September, 1879.)

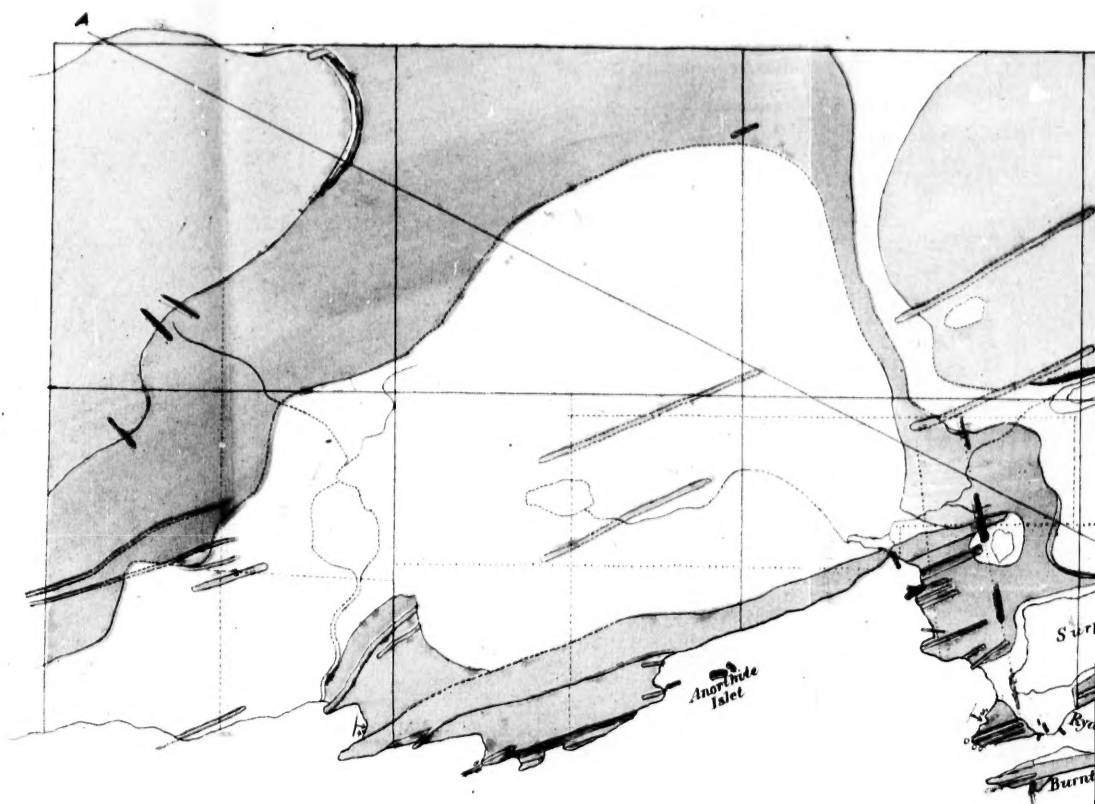
I. INTRODUCTION.

AMONG the industrial enterprises which have, from time to time, been undertaken in our Dominion, few have been more uniformly unsuccessful than those which have had for their object the development of our mineral resources. These resources have not been regarded as insignificant. On the contrary, it is supposed that we possess in our ore deposits something more than mere points of mineralogical interest. Some people are enthusiastic enough to believe that our mineral wealth will yet occasion the establishment in our backwoods of happy and industrious communities, causing, in fact, our wilderness to blossom as the rose. These enthusiasts do not shut their eyes to the serious obstacles which at every stage interfere with the carrying out of mining enterprises in this country, and which tempt one to believe that no such enterprise can ever be conducted to a desirable end, but they entertain the conviction that as our capitalists, miners, and technologists reach the years of discretion, and handle our mines in an economical, vigorous, and judicious manner, and as our statesmen become alive to the necessity of fostering, without extremely protecting, our metallurgical industries, mines and furnaces will gradually prosper, and so develop as to become a tower of strength to our agricultural, manufacturing, and mercantile interests.

The fact that our past experience does not generally justify such glowing anticipations makes one all the more anxious to put on record the history of a successful mine, such as the Silver Islet has, on the whole, been. My connection with its discovery and early development was a very intimate one, and I propose in this paper to sketch its history and character, and sum up the amount of silver it has so far yielded. An additional reason for the appearance of this paper is that the Transactions of the Institute



SECTION ON LINE A.B



LITHOLOGICAL MAP

OF

WOODS LOCATION

By Thomas Macfarlane

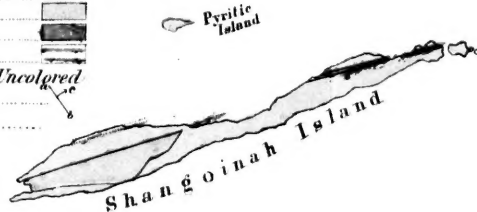
SCALE 2000 FEET TO AN INCH

EXPLANATIONS

- Grey argillaceous Sandstones and Shales*
- Conglomerate*
- Red and white dolomitic Sandstones and Shales*
- Cherty Limestone*
- Indurated Marl with white Sandstone*
- Diorite, Hyperite and Corsite*
- Anorthite Porphyry*
- Metalliferous Veins*
- Lakes, Swamps, and Alluvium*
- The line a b shows the strike c the dip of the strata thus*
- Exploration Lines*

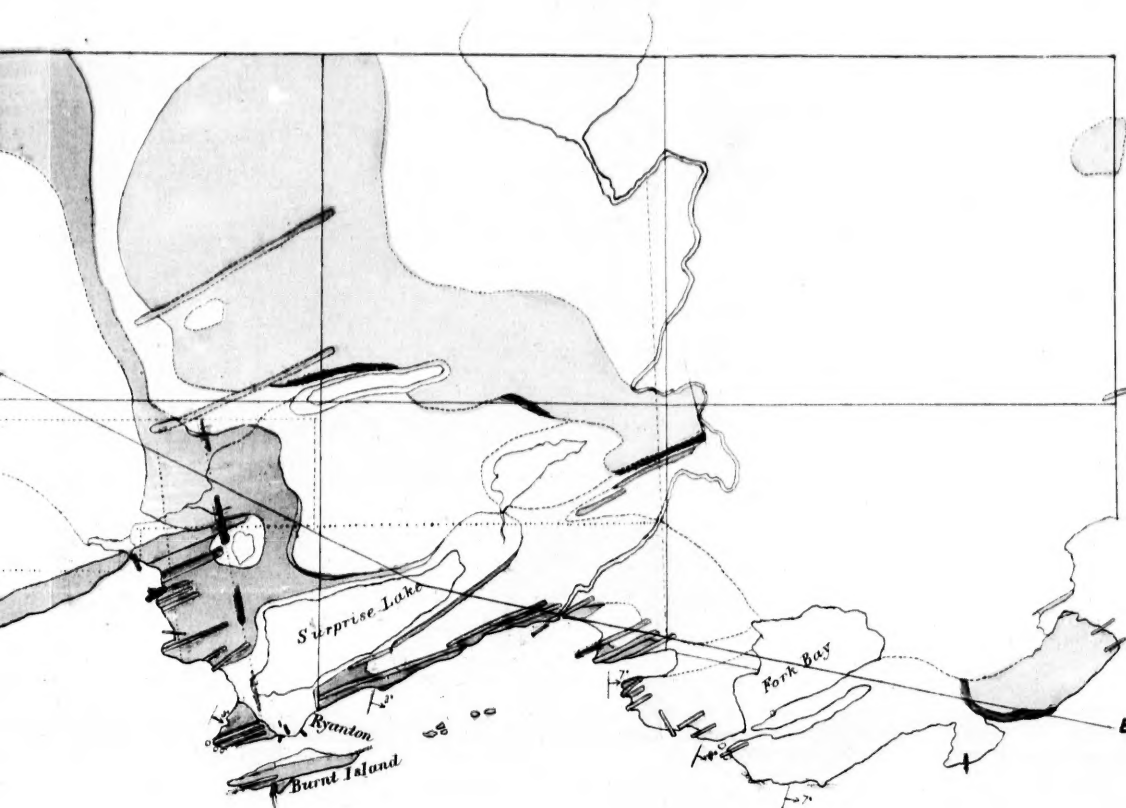


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SECTION ON LINE A.B.

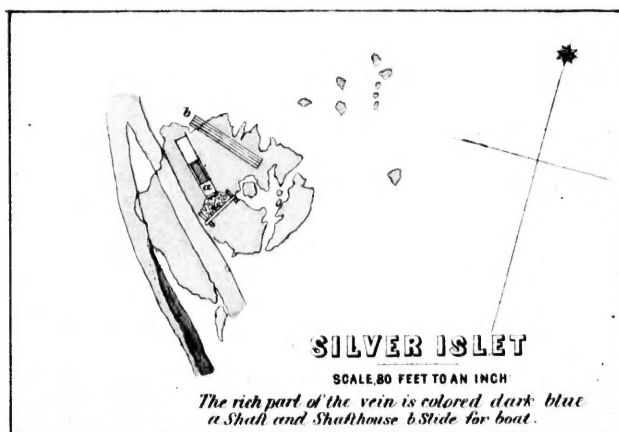
SURPRISE LAKE FORK BAY SE. LAKE LEVEL



E S U P E R I O R

Silver Islet

Island



contain only a few references to the Silver Islet Mine. Although this mine is reported successful, we have, of course, no guarantee that it shall not fall a victim to the same influences which have ruined other promising Canadian mines in days gone by. It is unnecessary to specify those influences. They are well known to all those who take any interest in the mining of the present day, and they are essentially the same as those which discouraged the miners of a century ago. Above the entrance of the silver smelting house of Kongsberg, in Norway, there is to be found an inscription upon an old stone, which had been taken from a similar position in the building which had been used for a century before the present one. This inscription dates from the time when German miners were brought north to work the Kongsberg silver mines. It is as follows :

" Eigennutz und Müßiggang
Ist des Bergwerks Untergang,"

which may be rendered thus :

" Selfishness and laziness
Spoil the mining business "

Long before 1868, the year of the discovery of Silver Islet vein, silver had been found on the northwest shores of Lake Superior. When, in 1846, the lands of the Montreal Mining Company were located, silver was reported as having been found on several of its properties. Later, the British American Mining Company worked the silver vein of Prince's Location, with the results recorded in the publications of the Geological Survey of Canada.* The revival, ten years ago, of silver mining on Lake Superior was, however, occasioned by the success of the Messrs. McKellar, of Fort William, who, from 1863 to 1867, employed themselves in exploring the neighborhood of Thunder Bay, and discovered silver at several points. One of these discoveries, at Current River, was worked by the Thunder Bay Silver Mining Company in 1868 and the year following, but with very discouraging results. It was, in all likelihood, the McKellar discoveries, together with the imposition by the Ontario Government of a tax of two cents per acre on Lake Superior mining lands, which prompted the Montreal Mining Company to begin a systematic exploration of their northwestern locations. For twenty-two years these had been allowed to lie almost entirely neglected. Several of

* Geology of Canada, 1863, p. 707.

them were in Marie, and t such as to en tions. Inde resources wer Bruce Coppe they experien sufficient to holders to ri above given erate outlay t ployed by th During the tions, and it first explorin sults for Nor the other loc

II. EXPLOR

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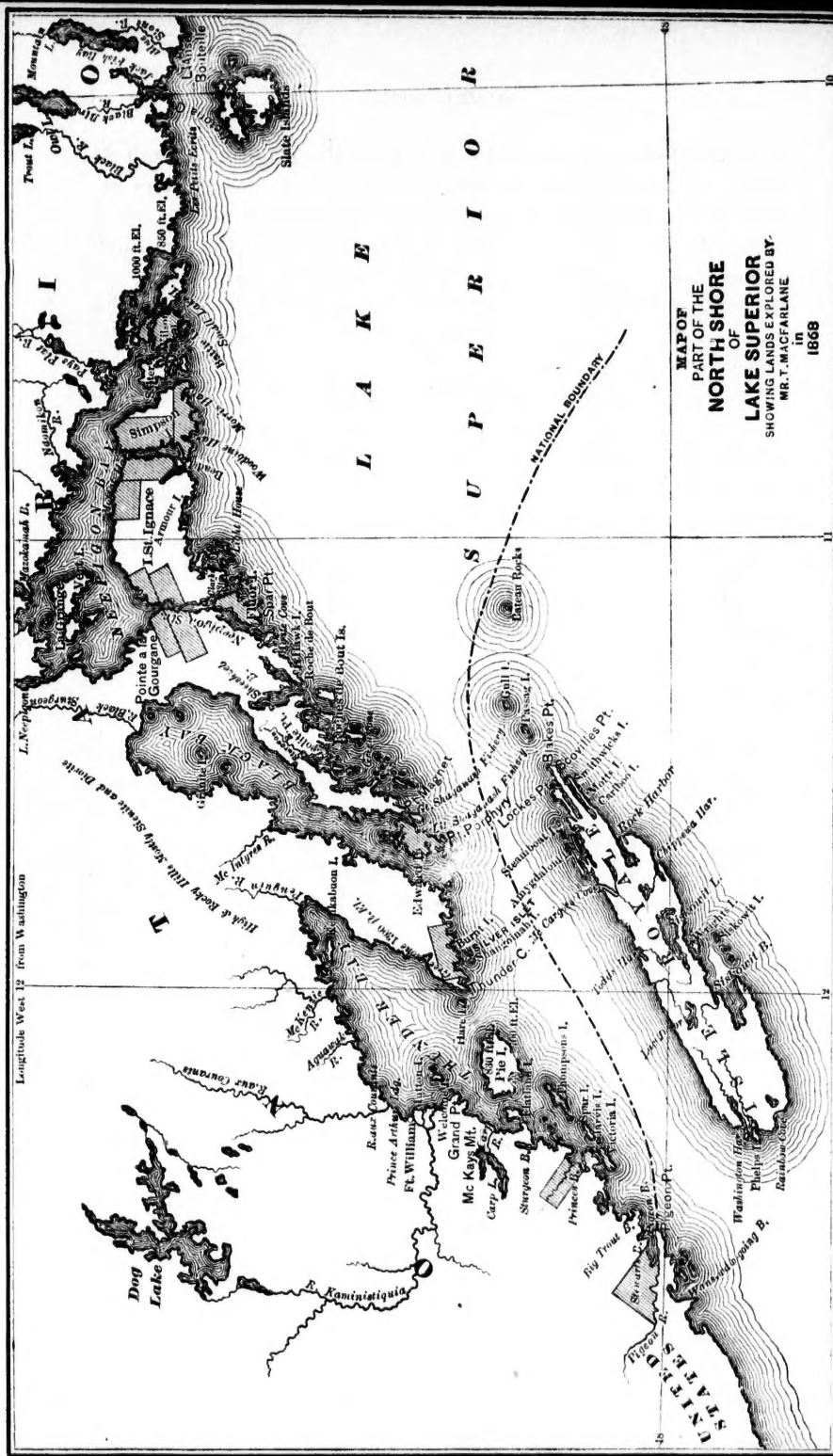
though guarantee have. It is known to day, aged the melting inscrip- ar posi- fore the German mines.

them were indeed visited and explored by Mr. Pilgrim, of Sault St. Marie, and the late Mr. Herrick, P.L.S., but the results were not such as to encourage the company to proceed to active mining operations. Indeed, during the greater part of this time the company's resources were taxed to the utmost in developing and working the Bruce Copper Mines. It may safely be asserted that in doing this they experienced a dead loss of \$400,000, a fact which is abundantly sufficient to account for the unwillingness of the board and shareholders to risk further capital in mining operations. The causes above given were, however, enough to induce them to incur a moderate outlay for exploring their lands, and early in 1868 I was employed by the company to take charge of a party for this purpose. During the first year I was able to visit all the northwestern locations, and it may not be uninteresting here to give a narrative of our first exploring voyage, from which have sprung such important results for Northwestern Ontario, reciting our experiences regarding the other locations, as well as the one to which Silver Islet belongs.

II. EXPLORATION OF 1868 AND DISCOVERY OF SILVER ISLET.

On the 16th of May our exploring party, consisting of six men besides myself, arrived in Thunder Bay, on board the steamer Algoma, which was heavily freighted with men and materials for working the Thunder Bay Company's Mine. After visiting the latter and the Shuniah (now the Duncan) Mine, and calling the attention of the men of our party to the appearance and characters of the native silver and silver glance produced by them, we started in our Mackinaw boat on the 19th southwestward for Jarvis's Location.* My first impressions as to the mineral resources of Thunder Bay district were not at all encouraging. With a country rock mainly composed of grayish flags and red and white sandstones, and these lying in an almost horizontal position, the chances for finding anything of value seemed very slender to one accustomed to highly inclined and crystalline rocks. I remembered, however, that the conglomerate beds of Keweenaw Point, now the most productive and remunerative for copper, had originally been undervalued by geologists, who had never before observed valuable minerals to occur in rocks of that nature, and resolved to beware of allowing preconceived ideas to interfere with the thoroughness of our search.

* With regard to this and other localities, their positions will be seen on consulting the accompanying small map of part of the north shore of Lake Superior.



From the 20th to the 31st of May, inclusive, we remained on Jarvis's Location, examining its rocks, surveying the river from its mouth to where it leaves the location, and exploring Jarvis's Island, with the numerous veins occurring there. The geology of this location much resembles that of the western part of Wood's Location,* having the same gray argillaceous sandstones and shales, intersected by dikes of different sorts. The latter have here the same general strike as on Wood's Location, and it appears evident that they run through the range of islands which extends from Shangoinah Island and Silver Islet, on Wood's Location, past the outside of Pie Island to Prince Albert or Thompson's Island; then, still further southwest through Spar Island, Jarvis's Island and Victoria Island, joining the mainland before Pigeon River is reached. On Jarvis's Island five different veins were found, and in one of them native silver and silver glance were discovered (the former by Mr., now Dr., C. O. Brown, and the latter by Mr. Patrick Hogan), specimens of which were forwarded to Montreal. The quantity appeared at the time insufficient to merit much attention, but, from the experience afterwards acquired on Wood's Location, I was induced to believe that some work upon this vein might possibly develop a larger quantity of the metal. Accordingly, in 1869, a shaft was sunk on this vein to the depth of twelve feet, in accomplishing which work the following ore was produced.

79 lbs first quality ore, containing 3.45 per cent. silver = 39.7 ounces,	
at \$1.25,	\$49.62
2483 lbs. second quality ore, containing 0.15 per cent. silver = 54.18	
ounces, at \$1.25,	67.72
	<hr/>
	\$117.34

On the 1st of June we left Jarvis's for Stewart's Location, at Pigeon River, where we remained until the 21st, making a very close exploration for a distance of three miles inland. The number of dikes and veins here visible induced me to anticipate the best results, but although a good deal of time was spent on some of the veins none of them yielded any valuable minerals. High rocky ranges intersect this location generally in the direction of the dikes, and between them lie valleys containing a large area of good soil, much of which will no doubt be cultivated so soon as mining operations are carried on successfully in the neighborhood.

On the 21st of June we returned to Fort William, and on the 23d

* Canadian Naturalist, IV, N. S., p. 37.

reached Thunder Cape and Wood's Location, where we remained until 31st July. From perusing the *Geology of Canada* I had, before arriving on the location, come to the conclusion that it was likely to present many interesting geological features. Here it was to be expected that the junction of Sir W. E. Logan's upper and lower groups of the Upper Copper-bearing rocks would occur, and that the many intersecting dikes and the trap overflow of Thunder Cape would be found to present interesting relations to the sedimentary rocks. I therefore determined to make a complete geological map of Wood's Location, and arranged with my assistant, Mr. Gerald C. Brown, to have the shore line accurately surveyed. It was while engaged planting his pickets on the many islands fronting the location that Mr. Brown first landed on the rock shortly afterwards named by me "Silver Islet," and observed the vein and the galena occurring in it. I then visited the island to obtain specimens of the galena and the inclosing rock, and three men were set to work to blast out some of the galena. It was while engaged working on the Islet that one of these men, Mr. John Morgan, found the first nuggets of metallic silver, close to the water's edge. A single blast was sufficient to detach all the vein rock carrying ore above the surface of the water, but further out large black patches could be observed in the vein under water, some of them with a greenish tinge. On detaching and fishing up pieces of these they were found to consist of galena, with which were intermixed spots of an oxidized black mineral, here and there tinged with green. This black substance I succeeded in reducing on charcoal, before the blowpipe, with a little borax, to metallic silver, thus exposing at once the extraordinary richness of the black portions of the vein. I deem it worth while thus to record, more particularly than heretofore, the circumstances of the discovery, on account of the celebrity which Silver Islet has since attained. The silver was discovered on the 10th of July, and on the 15th three packages of the best specimens were shipped from Fort William to Montreal, and a telegram sent at the same time to the company's secretary giving notice of the important discovery.

A marked difference is observable between the geological structure of the locations to the southwest and those to the northeast or east of Wood's Location. The conglomerate and red sandstones which constitute the eastern part of the latter are, further to the eastward, overlaid by numerous beds of different species of basic crystalline rock, most of them bearing some resemblance to those of the dikes

occurring on Wood's Location. Derbyshire's, Merritt's, Ewart's, Ferrier's, Harrison's, Turner's, and Wilson's locations all show the sandstones with superincumbent overflows of basic rock, while Hopkirk's, Lyman's, Bagg's, and McGill's are exclusively made up of the latter, together with some beds of a trachytic nature.

The first of the eastern locations, Derbyshire's, on Point Porphyry, was reached on the 31st of July. The most of the veins indicated by previous explorers were carefully examined. Native copper and copper glance were the minerals of importance observed, but only in minute specks. It is to be regretted that the mention of the occurrence of native silver on this location, contained in former reports, leaves the precise spot unindicated. We left this location on the 4th of August, but were unable to reach Fluor Island until the evening of the 5th.

From that date till the 15th of August our party camped on Hopkirk's Location, Fluor Island. Its rocks are mostly hard and compact traps, and amygdaloidal beds are rare. No economic minerals were observed in the veins or rocks of this location, excepting a few specks of native copper and iron pyrites. An excursion was made from Fluor Island to the locations on Nipigon Straits. On Lyman's Location only one vein of respectable size was found, upon which several openings had been made. A little copper glance only was observed, but the character of the veinstone somewhat resembles that of Silver Islet. On Merritt's Location no veins were observed along the shore, but at its northwest corner an old drift was found choked up with rubbish. At numerous points along the shore of Ewart's Location metallic copper was found in trapean rocks, but mostly unconnected with any regular vein or bed. At only one point was it observed that the copper ran in a streak conformable with the stratification of the adjoining rocks, and here it was in deficient quantity. Observations similar to these were made at the workings north of Point a la Gourgaune, and on the shore of Bagg's Location.

Shortly after returning from Nipigon Straits, we left Fluor Island, and on the 19th of August arrived at Harrison's Location on the east end of Isle St. Ignace. Of all the northwestern locations it is the one of which the best accounts are given in the old reports. We remained upon it ten days, part of the time at Harrison's Landing, on the south part, and the remainder at Moffatt's Harbor, on the northeast shore of the location. A day was spent in examining the shore of Simpson's Island on the opposite side of St. Ignace Straits. More excavation has been done, buildings erected, and money spent,

on Harrison's Location than on any of the others. It is, however, very difficult to find traces of any minerals sufficiently valuable to justify the expenditures which have been made here. Several shafts have been sunk eastward from Harrison's Landing, but a careful search in the veinstone from these failed to show more than a few minute grains of copper pyrites. Along the shore, in the neighborhood of these shafts, loose pieces of veinstone were found, containing copper glance, sometimes in pretty solid "prills," the source of which was found to be a vein about thirty feet distant from the shore, under water. Further search was made by us and considerable excavation done on its apparent strike to the eastward, but without success. No silver was visible along with the copper glance in the boulders, or in the vein under water. The so-called silver veins occurring to the north of Moffatt's Harbor were found to be of a peculiar description. Instead of being several feet in width, as described in the old reports, none of them exceed two or three inches. Some of them occur within three or four feet of each other, and the intervening rock has evidently been regarded as part of the vein and included in its alleged width. The three shafts sunk here were full of water and rubbish, and we had not the necessary appliances for emptying them. A thorough examination was made of the veins on the surface, and blasting done on them, which exposed finely disseminated particles of copper glance. Among the debris on the shore a small piece of veinstone was found containing native silver.

On the 29th of August we left Moffatt's Harbor, and sailing past the north ends of Simpson's and Salter's Islands, reached "North Harbor," on Wilson's Location. Here we remained fifteen days, making a close examination of Wilson's Island and of those lying to the north of it. Numerous veins were found, some of them of good width, containing calcspar, quartz, and laumontite, but no metallic minerals. In several of the amygdaloid beds metallic copper was found; once on the northwest shore of Wilson's Island it occurred in tolerable quantity, but still not sufficient to be remunerative.

We left Wilson's Location on the 14th of September, and the same day reached Morin Harbor, on Simpson's Island. Six days were employed in examining McGill's Location. Its rocks are principally hard agatic traps, with but little indication of copper, except an occasional speck in an agate geode. Numerous veins are visible, sometimes with copper glance in very small quantity. About half-way along the front of the location from Morin Harbor a good many

pieces of prehnite containing pretty solid native copper were found on the shore. These are derived from a bed of compact trap, containing large geodes with quartz, laumontite, calcespar, native copper, etc. The number of the geodes is, however, too small to render the mass of the rock workable. On the southwest end of the location, near Woodbine Harbor, characteristic basalt was, for the first time, observed, showing both straight and bent columns.

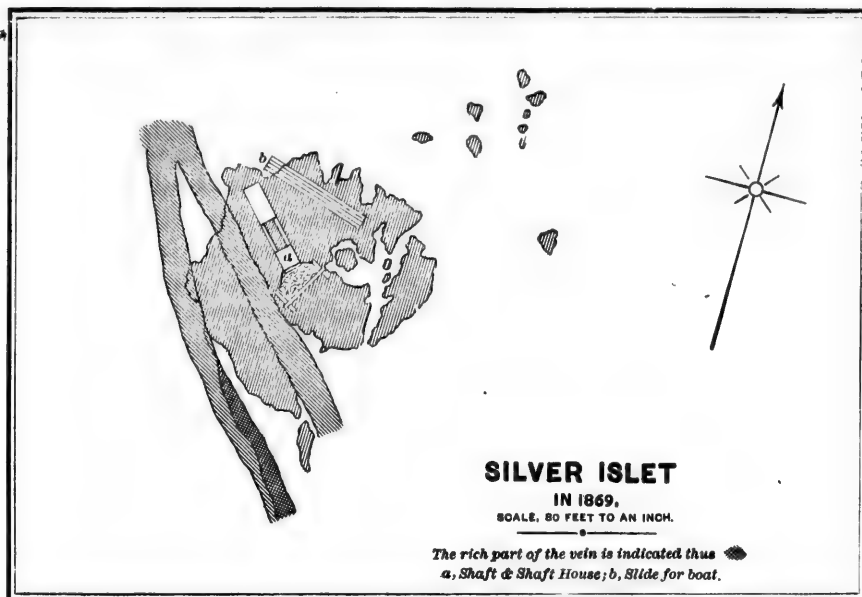
Although we were unsuccessful in discovering any valuable deposits on the territory east of Silver Islet, it would be quite erroneous to infer their entire absence. The time devoted to the exploration of this district was too short to allow of exhaustive work. Indeed, this exploration was felt at the time to be merely a reconnaissance, preparatory to more effective work after the locations had been regularly defined by a provincial land surveyor. These surveys were afterwards completed, but the explorations were not resumed. It must further be remembered, that the mineral lands in question are densely wooded, and covered by a thick layer of moss almost to the water's edge. These obstacles (which are seldom met with by western explorers) interfere materially with a thorough search. They are sometimes removed by forest fires, and it is probable that, after the occurrence of these, a diligent "prospecting" for minerals would be well rewarded.

On account of very stormy weather we did not reach the steamboat landing, Isle St. Ignace, until the 23d of September, three days after leaving McGill's Location. The Algoma was due on the 24th, but did not arrive till the 26th. After going west to Fort William, and leaving our boat, portable forge, and other heavy articles there, we left Thunder Bay on the 27th of September, en route for Montreal.

III. GEOLOGY OF SILVER ISLET AND ITS VEIN.

My plan as to a geological survey of Wood's Location was, during the following season (1869), carried to completion, and the results published in the *Canadian Naturalist* (vol. iv), accompanied by a map of the location and plan of Silver Islet, the latter of which is republished herewith. Silver Islet is situated about three-quarters of a mile from the mainland, and is much exposed to storms from the west, southwest, and east. Shangoinah Island protects it, but inefficiently, on the southwest. The island measured originally about ninety feet each way, rising about eight feet at its highest part above

the level of the lake. The whole of the rock is now inclosed and covered by the works erected for protecting and working the mine, and by new land since made. The course of the vein traversing the Islet is about N. 35° W., and its dip about 85° S.E. As



shown in the plan, its greatest width is on the northwest side of the islet, and it will be seen that in going southward it divides into two branches, one of which crosses the islet, and the other keeps on the west side, under water. The south part of the latter branch carried the richest ore, the eastern branch being less rich, and the whole of the vein to the northward being almost entirely barren, and consisting of a huge mass of calcespar, with quartz and occasional cubes of galena, which carry only a minute quantity of silver. Particles of silver ore were also found in some of the small "feeders" which intersect the country rock (or perhaps "horse") lying between the two veins. Fragments and masses of this rock are very often inclosed in the veinstone, and graphite very frequently associates itself with them.

The metallic minerals of the veins are silver, silver glance, tetrahedrite, domeykite, galena, blende, iron and copper pyrites, cobalt bloom, and nickel green. The two latter substances seemed to be oxidation-products of a peculiar mineral, which, in a paper published

in the *Canadian Naturalist*, and dated 1st February, 1870, I described as follows: "Besides the small nuggets and grains of pure metallic silver, there are also found in the rich ore, thin plates and grains of a sectile mineral, having a reddish-brown color, like that of niccolite, and containing arsenic, cobalt, nickel, and silver, with the latter in greatest quantity. This would appear to be a new mineral and one worthy of more minute examination." When active work was begun by the Silver Islet Mining Company, it was found that the great bulk of the silver extracted was contained in a granular mixture of the reddish-colored grains above mentioned with other minerals. The late Major A. H. Sibley—then president of the company—gave this mixture the name of "*Macfarlanite*," which is still used for it by superintendent and workmen at the mine up to the present time. In the *Engineering and Mining Journal* of 29th March last, Mr. W. M. Courtis published a paper on Lake Superior silver ores, in which this supposed new mineral is also referred to as "*Macfarlanite*." For these reasons it would seem necessary to refer to this substance more particularly. In December, 1870, I made an examination of the brown metallic grains which the rich ore above referred to leaves when pulverized in a diamond mortar, and all brittle minerals, such as calcespar, galena, etc., sifted or washed off. A blowpipe assay showed these to contain:

Silver,	.	.	.	.	.	.	.	.	78.84
Nickel,	.	.	.	.	.	.	.	.	6.98
Cobalt,	.	.	.	.	.	.	.	.	2.75
Arsenic, etc. (difference),	.	.	.	.	.	.	.	.	12.98
									100.00

I made some further trials, but was unsuccessful in separating any definite mineral.

In December last Dr. T. Sterry Hunt informed me of the discovery of the new minerals in Silver Islet ore by Dr. Wurtz, and showed me a specimen of "*Huntelite*," which seemed to me to occur in larger pieces, and to be different from the reddish grains occurring in the ore known as "*Macfarlanite*."

On subjecting the rich granular ore of Silver Islet to closer examination, assisted by Mr. W. M. Courtis, I found it to consist of the reddish-brown metallic grains, a dark-colored undetermined mineral, niccolite, galena, calcespar and quartz. Native silver in perfectly white grains or filaments is not distinctly seen. Pieces of the ore, upon being ground and polished, show the

metallic grains with a color and lustré closely resembling bur-nished nickel. When the calcespar, which is the principal gangue, is removed by dilute hydrochloric acid, the result is porous and coherent. The metallic minerals adhere to each other and to the metallic grains, the latter seeming to be in places coated or incrust-ed with the dark-colored mineral and the niccolite. Under the hammer, the metallic grains flatten out, and the glass shows that both brown and black brittle grains have separated. Still, in this process, all the metallic minerals do not seem removable, but adhere, more or less firmly, to the metallic grains.

When the ore is pulverized, and the metallic grains are freed from all brittle materials, the latter being sifted and washed off, they assay from 75 to 84 per cent. of silver. When these are further trituration in an iron mortar six different times, and the brittle matter removed by sifting on a sieve with 50 meshes to the lineal inch, the siftings thus produced assay as follows :

1st time,	46.41 per cent. silver.
2d "	51.55 " "
3d "	59.25 " "
4th "	66.24 " "
5th "	76.1 " "
6th "	83.7 " "

The grains remaining upon the sieve from the last trituration have a dark-gray color and assay 92.04 per cent. silver. When roasted in a muffle they become yellowish-brown. Hydrochloric acid removes nickel oxide, and then they have the appearance of pure silver grains. In this process they lose 6.94 per cent. of their weight, and assay 95.76 per cent. silver. Triturated a second time in this manner they lose 2.12 per cent. additional, and assay 97.42 per cent. silver. From this it is evident that they assume the appear-ance of metallic silver on the surface only, and are not pure through-out. The grains of 92.04 per cent. when treated alone on charcoal, before the blowpipe, merely cake together, yielding a slight coating of arsenious acid. When a small quantity of borax is added, a silver button is produced, with some speiss attached, and a slag slightly tinged with cobalt oxide. Most of the nickel is removed in the speiss, but the silver still retains some of it, and upon cooling shows a greenish-gray film. This is removed by a further slight scorifi-cation with borax, and 91.33 per cent. silver is obtained. The grains of 92.04 per cent. silver dissolve readily in dilute nitric acid, yielding the following results :

Insoluble (assays 17.46 per cent. Ag.), . . .	2.37
Nickel,	1.58
Antimony, . . . . .	.36
Silver,	98.54
Arsenic,	2.15
	<hr/>
	100.00

When the metallic grains first above alluded to are treated with dilute nitric acid (half acid, half water), and its action interrupted when about half the quantity is dissolved, a considerable quantity of a black powder is detached; much nickel is dissolved, and the remaining grains have the appearance of pure silver, but still showing black specks, especially in the cavities. These grains were found to consist of:

Insoluble,	1.85
Silver,	94.77
Antimony, . . . . .	.85
Nickel, . . . . .	.95
Arsenic (difference),	1.55
	<hr/>
	100.00

A quantity of the metallic grains were acted on by three successive portions of very dilute nitric acid. The resulting solutions contained as follows:

1. Silver,	37.646
Mercury, . . . . .	.649
Arsenic,	6.898
Antimony, . . . . .	.166
Nickel,	4.661
	<hr/>
	49.520
2. Silver,	33.692
Mercury, . . . . .	.099
Antimony, . . . . .	.059
Nickel,	1.220
	<hr/>
	35.070
3. Silver,	5.403
Antimony,	trace
Nickel,	trace
	<hr/>
	5.403
4. Insoluble quartz grains, etc., . . .	6.203
Black mineral washed off, . . .	3.756
	<hr/>
	9.959
	<hr/>
	99.952

The black substance washed off from the larger grains of quartz contains antimony, lead, cobalt, nickel, and sulphur, besides 24.79 per cent. of silver.

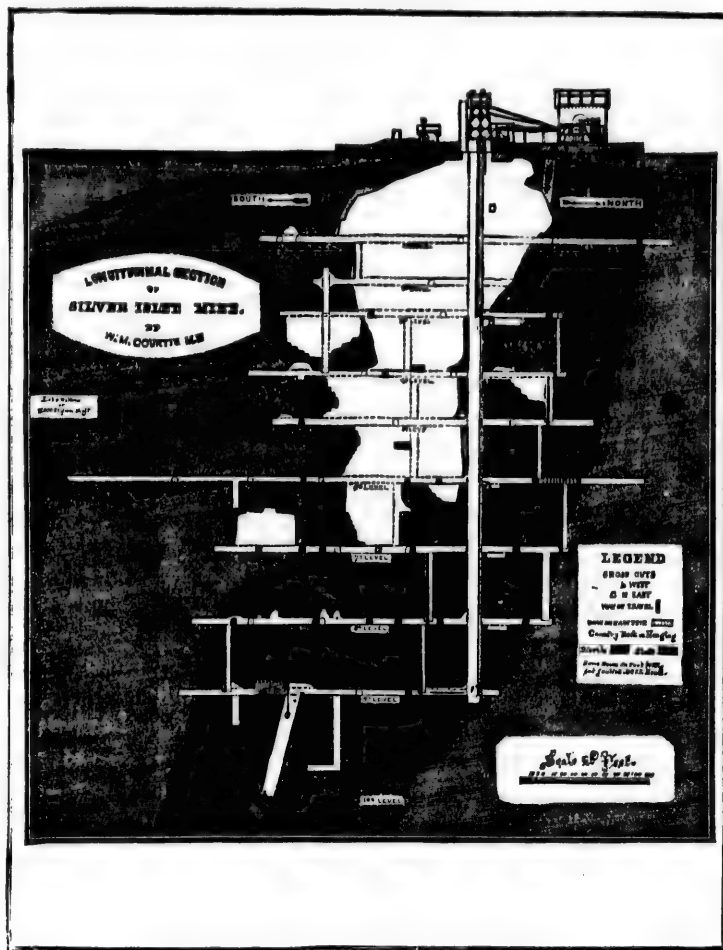
From the above experiments the great difficulty of separating the various minerals which occur in the rich ore of Silver Islet will be apparent. It seems to me to contain a great deal of its silver in the native state, which passes into the *animikite* of Professor Wurtz. Further investigation may possibly give more decided results.

With regard to the general nature of the ore yielded by the vein after sorting, one parcel of second quality—weighing 15,914 pounds, and assaying 964.2 ounces silver—was found to contain 71.5 per cent. of earthy carbonates and 14.15 per cent. of matter insoluble in acids. The relative quantity of calcareous and silicious matter varies, however, in different parts of the vein; and, in some places, streaks of quartz have preponderated to such an extent as to make some of the ore highly silicious, and much more difficult to smelt.

The rock on the Islet intersected by the silver vein is a chloritic diorite, evidently forming a dike. It differs somewhat from the rocks of the other dikes of this location, among which may be mentioned corssyte and anorthite porphyry. Judging from their manner of occurrence, it did not appear likely, when the discovery was first made, that the diorite of Silver Islet would be found to have a greater breadth than two hundred feet on the length of the vein. Outside of this distance it was anticipated that the vein would be found to intersect the gray flags, which fill out all the spaces between the various dikes. It was further thought unlikely that the Silver Islet vein, on reaching these flags, would exhibit the same degree of richness as previously. The continuation of Silver Islet vein across Burnt Island (which is identical with one shown on an old map of the location by Mr. Wilkinson), and also further inland, was traced out in 1869. It has been exposed at several points where it crosses the sedimentary beds, but there it is split up into numerous thin veins of quartz, and shows nothing of the great width which it carries on Silver Islet, nor have any of the rich silver minerals of that locality yet been found upon the mainland, or upon Burnt Island.

The experience gained in the working of Silver Islet Mine, since its discovery, has, in the main, confirmed the description here given of its geological relations. This will be seen in consulting the accompanying longitudinal section of the mine by Mr. W. M. Courtis, first published in the *Engineering and Mining Journal* of 21st December, 1878.

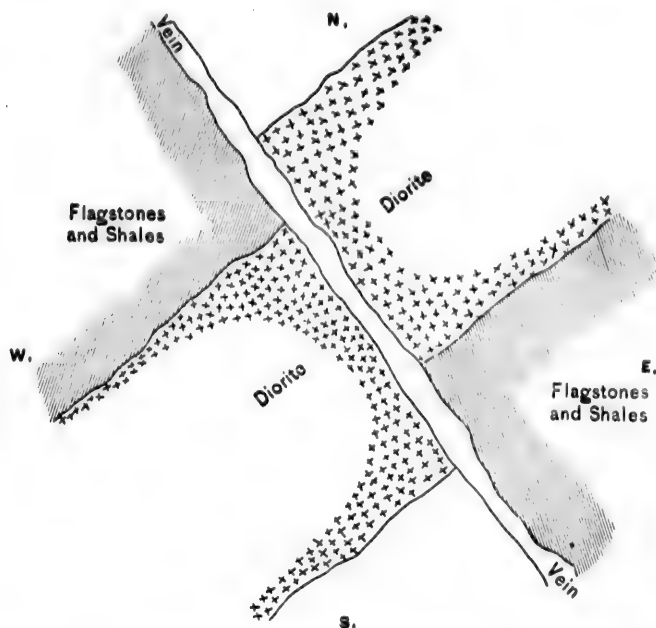
It will be observed that the diorite dike dips at a high angle southward, and that the workings have never been productive outside of it. Indeed, there are large areas of the vein inclosed by diorite walls on both sides which have yielded no ore. It is necessary



THE SILVER ISLET MINE, LONGITUDINAL SECTION.

to mention that the vein itself dips at a high angle to the eastward, and that Mr. Curtis's section shows the rocks adjoining the vein upon the hanging-wall only. On the west side of the vein it has been found that the diorite extends further south than on the hanging-wall. The line of the vein is, therefore, also the line of a fault,

which has moved the rocks on the west, or rather southwest, side of the vein eighty feet to the southeast, as shown in the accompanying sketch, which indicates roughly the relative positions of rocks and vein below the "5th level."



It is worthy of remark that the rocks intersected by the diorite dike are not highly inclined, semicrystallized slate, but are almost horizontal flagstones and shales.

The Silver Islet vein has exhibited a most remarkable phenomenon, which deserves mention here. The following is a description of it, taken from a letter dated 28th January, 1876, from Mr. W. B. Frue to the writer:

"On December 28th, while a party of miners were engaged in drilling a hole in the end of the drift on the '8th level,' the drill broke through into a small crevice or 'vug.' Water at once commenced to flow,—not in great quantity, however,—and one of the miners took a candle to look into the drill-hole, not being aware that there was a large escape of gas with the water. The gas instantly took fire, sending a flame out from the end of the drift for more than forty feet. The men, of course, threw themselves down on the bottom of the drift, and remained there uninjured until the flame subsided, and then went out to the shaft. After they had got over their fright, they

undertook to return into the drift, but when within forty feet of the end of the drift, the gas again ignited, filling the level with flame to within three feet of its bottom; the flame extending along the back of the drift, and burning for a distance of one hundred and fifty feet towards the shaft. The men again took shelter by throwing themselves down on the bottom of the level. Some time after this the men walked into and through the entire length of the drift without any light, and inserted a wooden plug in the hole through which the vapor and water were escaping. On the following day no gas was discovered in the drift, until a candle was brought close to the plug in the end of the level, when the gas again caught fire, giving a jet or flame about one foot long, which has been burning ever since."

This is, I believe, the first instance on record of the occurrence of an inflammable gas in a silver mine, and probably indicates that the rocks near Silver Islet are of much more recent age than has been generally supposed.

IV. MINING.

The discovery of Silver Islet in 1868, the full descriptions given of it, and the specimens of ore produced, valued at \$1200, were insufficient to induce the Montreal Mining Company to go into vigorous mining operations. The leaning of the shareholders was plainly in favor of selling rather than working, and the largest specimens found their way to England, where they were exhibited, and afterwards sent to Swansea to be sold and smelted. Negotiations, having for their object the sale of part of Wood's Location, including Silver Islet, were carried on and continued into the summer of 1869, but unsuccessfully. Meanwhile I had returned to the lake, completed the survey of Wood's Location, and employed the men in excavating as much ore as possible from the surface of the Silver Islet Vein. This was a matter of much difficulty and even danger. The summer of 1869 was exceedingly stormy, and it was only during the calmest weather that any excavation was possible. The cartridges procured for blasting under water entirely failed to work, but, nevertheless, 9455 pounds of excellent ore were produced and shipped to Montreal. On the 12th of August we began to sink a shaft in the centre of the Islet, from which it was intended, on attaining sufficient depth, to cross-cut to the vein. That this plan would have proved perfectly successful is evident from the fact that it has since been sunk and connected with the east vein, and is now known as "Macfarlane's Shaft." During the fall of 1868 a shaft-house was built on the Islet, and a boarding-house, storehouse, and

stable on the mainland, at a point now known as Silver Islet Landing. In the winter of 1869-70 a party of twelve men and one horse remained on Wood's Location. They were instructed to continue sinking the shaft, to take advantage of any opportunity afforded by the formation of the ice to excavate more ore from the outcrop of the vein, and when work at the Islet was impossible to cut timber in the woods for the cribwork proposed to be constructed the following season.

The sinking of the shaft had to be discontinued on account of the influx of water, but the excavation of ore was very successful. The ice formed around the islet, and kept unbroken for nearly two months. It facilitated the work very much, keeping the water perfectly still, and affording the men a convenient platform. The blasting under water, with cartridges made on the spot by Mr. M. Biggar, was successful, and extended over about thirty feet of the vein. The loose veinstone was then fished out of the water by means of long tongs, constructed on the spot, long-handled shovels, etc.; then teamed to the mainland, and there sorted. In this way nearly nine tons of ore were produced and shipped to Montreal in the spring of 1870. The following is a statement of the entire amount of ore produced during the operations of the Montreal Mining Company, with my assays and estimates of the value of the silver it contained:

When produced.	Net weight, lbs.	Percentage of silver.	Ounces per ton of 2240 lbs.	Value per ton of 2240 lbs.	Total value.
1868,	1,336	5.169	1,690	\$2,095.00	\$1,249.51
1869,	3,429	2.760	889	1,111.25	1,701.10
"	4,080	4.344	1,417	1,771.25	3,226.20
			Of 2000 lbs.	Of 2000 lbs.	
"	1,946	5.147	1,680	2,100.00	1,824.37
1870,	17,669	5.503	1,605	2,070.45	18,291.39
	28,460				\$26,292.57

The above ore, after being sold or smelted, realized the following quantities and values of silver:

When sold or smelted.	Where sold or smelted.	Net weight, lbs.	Ounces per ton of 2240 lbs.	Value per ton of 2240 lbs.	Total value.
Sept. 4th, 1869,	Swansea,	1,209	1,397	\$363 $\frac{1}{2}$	\$962.13
" "	New York,	127			190.50
" "	Swansea,	3,322	982	254 $\frac{7}{8}$	1,821.96
Oct. 29th, 1869,	"	4,006	880	228 $\frac{1}{2}$	1,970.03
			Of 2000 lbs.	Of 2000 lbs.	
Feb. 24th, 1870,	Newark, N.J.,	1,913	1,608 $\frac{1}{2}$	2,075	1,984.73
" "	"	2			11.28
Feb. 16th, 1872,	"	17,481	1,429	1,843.41	16,112.32
" "	"	13 $\frac{3}{4}$			62.40
		28,073 $\frac{3}{4}$			\$23,115.85

It will be observed that this ore realized \$3177.22 less than estimated, and that the greatest deficiency, in proportion to the quantity, occurs in the parcel of 4080 pounds sent to Swansea. No satisfactory explanation of the cause of the difference was ever received, and it was consequently deemed advisable to ship all the ore afterwards produced to Newark, N. J. The parcel sold there in February, 1870, resulted very satisfactorily; but a discrepancy occurred in the 8 $\frac{3}{4}$ tons afterwards sent. This parcel of ore, on its arrival in Newark, was crushed and sampled in the usual manner, and, as the first assays resulted much lower than that of the sample taken at Silver Islet, and given above, numerous trials were made by various New York assayers, always with most extraordinary differences as to yield. It is extremely probable that these differences were owing to the impossibility of effecting a perfectly equal distribution of the metallic grains throughout the mass of the sample. Mr. Balbach refused to account for more silver than his assay indicated, and efforts were made to effect a sale of the ore elsewhere than in Newark, but without effect, and it was finally treated by Mr. Balbach on the basis of his assay.

The facts connected with the production of ore in the winter of 1869-70 were published in the Montreal papers in June, and attracted much attention in England and the United States. That ten men had been able to produce \$16,000 worth of ore, and that the actual time employed by them, in so doing, had not exceeded fourteen days, was again insufficient to induce the Montreal Mining Company to proceed to work the Silver Islet vein. The experience gained during the summer of 1869 had convinced me that very strong and extensive works would be necessary in order to protect the Islet and mine from the severe storms which frequently prevail off Thunder Cape. It had also become plain that a large force of men, with a steam-tug and scows, would be necessary for putting the cribbing into place, and securing it *quickly*, so as to prevent its being washed away while in process of erection by the heavy seas which rising gales suddenly bring in from the lake. I estimated that at least \$50,000 would be required to establish a mine on the Islet, and recommended it as being for the interest of the shareholders that the company itself should work the mine.

In the event of their being unwilling to raise the necessary working capital, I recommended efforts on the part of the board to sell the Silver Islet property. Their decision resulted in favor of the latter policy, and not only was it decided to sell Silver Islet, but the

idea was adopted of endeavoring to effect a sale of the whole of the company's property, on the strength of the discoveries already made. Negotiations were carried on for this purpose during the spring and summer of 1870, which resulted in the transfer of the whole property into the hands of certain capitalists in New York and Detroit in September.

The first intimation which I had of the sale of the whole property was at Silver Islet on the night of the 31st of August, when the propeller "City of Detroit" arrived, having on board Mr. W. B. Frue, a working party of about thirty men, two horses, machinery, stores, provisions, etc., and having in tow a large scow and a raft of large-sized timber. The propeller discharged her cargo next day, and operations were begun at once and vigorously to establish a permanent mine on Silver Islet. In spite of severe weather extensive breakwaters were built, part of the vein inclosed by a coffer-dam, the area within the latter pumped dry, a considerable amount of mining done, and about seventy-seven tons of ore shipped before the close of navigation. The time devoted to mining was about four weeks, and the last shipment was made about the 25th of November. About \$80,000 were expended in the above operations, and in making provision for wintering, long before any returns were obtained from the ore. Indeed, it was not until March, 1871, that the smelting of the fall shipments at Newark was completed. I was employed by the new company to superintend the sampling of this ore, and the following statement shows the value of the silver in the ore produced by them in 1870, according to my assays :

No. of parcel.	Net weight, lbs.	Percentage, silver.	Ounces per ton of 2000 lbs.	Value per ton of 2000 lbs.	Total value.
1	34,862	2.553	744.8	\$960.90	\$16,749.53
2	16,592	2.156	628.8	811.15	6,729.30
3	17,523	2.690	784.5	1,012.00	8,866.63
4	17,772	2.973	867.2	1,118.75	9,941.34
5	16,379	3.358	979.4	1,263.48	10,347.26
6	15,914	3.306	964.2	1,243.81	9,896.99
7	19,139	4.348	1,268.1	1,635.84	15,654.17
8	17,139	4.687	1,367.0	1,763.43	15,111.71
Metallic grains	33	15.136	4,414.6	5,694.83	93.96
Specimens.	187	9.060	2,652.4	3,421.59	319.92
Metallic grains.	3	67.658	19,733.3	25,455.95	38.18
155,543 lbs., averaging per ton				\$1,205.44	\$93,748.99

Messrs. Balbach's assays of the same ore are given in the subjoined table :

No. of parcel.	Net weight, lbs.	Percentage, silver.	Ounces per ton.	Value per ton.	Total ounces.	Total value.
1	84,862	2.406	701 9	\$905.46	12,234.9	\$15,783.15
2	16,592	2.250	656.0	846.24	5,442.1	7,020.40
3	17,523	2.680	781.6	1,008.26	6,847.9	8,833.86
4	17,772	2.905	847 5	1,093.28	7,531.0	9,715.00
5	16,379	3.385	987.3	1,273.63	8,085.4	10,430.39
6	15,914	3.170	924 5	1,192.60	7,356.2	9,489.51
7	19,130	4.220	1,230.0	1,586.70	11,770.4	15,183.92
8	17,139	4.510	1,315.0	1,696.35	11,268.8	14,536.87
Metallic grains.	33	15.136	4,414.6	5,694.83	72.8	93.96
Specimens.	187	9.060	2,652.4	3,421.59	248.0	319.92
Metallic grains.	3	67.658	19,733.3	25,455.95	29.6	38.18
155,543, averaging per ton				\$1,175.80	70,887.1	\$91,445.16

While this ore was being disposed of in the winter of 1870-71 Mr. Frue and his men were fully occupied at Silver Islet, where a very stormy season was experienced. During the previous winter the ice had formed quietly and remained till the spring, when it was gradually softened by the heat, moved out quietly into the lake, and did not reappear. Mr. Frue was, therefore, somewhat unprepared for the great trouble which the different behavior of the ice during the following season caused him. The placing of the cribbing was tedious and hazardous work. The ice did not form solidly for any considerable time, but kept floating backwards and forwards the entire season. During much of the time Mr. Frue and his men had to cut their way from the mainland to the Islet, through fields of solid ice recently formed, and, shortly afterwards, through floating floes three feet in thickness and of all sizes up to fifty feet square. Towards the end of February severe gales were experienced, which lent tremendous force to the floating ice, and tore away cribwork to an extent of two hundred and forty feet in length. The heaviest timber was insufficient to withstand the ice; large logs had their extremities chafed to such an extent as to resemble only huge brooms, and bolts, one and a half to two inches in diameter, were twisted and broken apparently with the greatest ease. After the removal of the cribbing the seas were so heavy as to dash over what remained, and fill up the coffer-dam in a very short time. The dam itself, however, sustained very little damage, and, going to work indefatigably to repair damages, Mr. Frue was able to resume mining in about a month afterwards. By the 1st of May, 1871, an excavation had been made on the rich part of the vein inclosed by the coffer-dam, leaving a length of sixty five, depth of thirty-two, and an average width of eight feet. By the close of navigation, in November, this working

had attained a depth of ninety feet, and had produced, from the same time in 1870, about four hundred and eighty-five tons of ore, of which the following quantities were treated at Newark in the summer of 1871 :

No. of parcel.	Net weight, lbs.	Ounces per ton of 2000 lbs.	Value per ton of 2000 lbs.	Total ounces.	Total value.
1, A.	6,558	1,184.1	\$1,539.33	8,879.70	\$5,043.61
1, B.	14,986	1,406.4	1,828.32	10,538.15	13,699.60
2, A.	16,627	1,149.1	1,493.83	9,553.04	12,418.95
2, B.	3,824	1,470.1	1,911.13	2,810.83	3,654.08
3	17,393	1,131.6	1,471.08	9,840.95	12,793.23
4	19,651	1,166.0	1,515.80	11,456.53	14,893.48
5	18,630	1,281.8	1,666.34	11,939.96	15,521.95
Metallic grains.	375	4,145.0	5,388.50	772.20	1,003.86
6	17,959	1,198.7	1,558.31	10,763.72	13,992.85
7	16,730	1,134.5	1,474.85	9,490.09	12,337.12
8	17,954	1,105.3	1,436.89	9,894.64	12,863.03
9	18,975	947.8	1,232.14	8,992.25	11,689.92
10	13,189	907.0	1,179.10	5,981.21	7,775.57
Metallic grains.	657	1,415.8	1,840.54	465.10	604.63
	183,453			106,378.37	\$138,291.88

There were further treated, at the Wyandotte Smelting and Refining Works, the following parcels of ore, and in the order as they are here given :

Quality of ore.	Net weight, lbs.	Ounces per ton of 2000 lbs.	Value per ton of 2000 lbs.	Total ounces.	Total value.
No. 1.	6,919½	4,180.0	\$5,434.00	14,462.00	\$18,800.60
No. 2.	16,918	1,395.0	1,813.50	11,799.00	15,338.70
"	19,340	1,139.0	1,480.70	11,014.00	14,318.20
"	7,500	1,332.0	1,641.60	4,995.00	6,493.50
"	13,750	1,318.0	1,713.40	9,061.00	11,779.30
"	49,500	961.8	1,250.34	23,804.55	30,945.91
"	38,750	1,671.4	2,172.82	32,383.37	42,098.38
"	36,750	1,077.3	1,400.49	19,795.38	25,733.99
"	60,000	1,258.4	1,635.92	37,752.00	49,077.60
"	64,343	1,080.0	1,404.00	34,745.00	45,168.50
"	4,000	990.9	1,288.17	1,981.80	2,576.34
"	55,000	997.4	1,296.62	27,428.50	35,657.05
No. 3.	15,000	183.2	238.16	1,374.00	1,786.20
"	20,000	108.6	141.18	1,086.00	1,411.80
No. 2.	16,232	997.4	1,296.62	8,094.89	10,523.36
"	20,253	615.0	799.50	6,227.79	8,096.13
"	15,607	270.6	351.78	2,111.62	2,745.10
"	27,017	990.9	1,288.17	13,385.57	17,401.24
"	34,469	1,107.0	1,439.10	19,078.59	24,802.17
"	37,615	925.5	1,203.15	17,406.34	22,628.25
"	37,500	545.0	708.50	10,218.75	13,284.38

Quality of ore.	Net weight, lbs.	Ounces per ton of 2000 lbs.	Value per ton of 2000 lbs.	Total ounces.	Total value.
No. 2.	18,560	1,029.0	\$1,337.70	9,549.12	\$12,413.86
"	24,605	754.0	980.20	9,276.08	12,058.90
"	17,998	814.3	1,057.59	7,327.88	9,526.24
"	17,002	680.3	884.39	5,783.23	7,518.20
"	15,929	813.5	1,057.55	6,479.12	8,422.86
No. 3.	17,500	144.8	188.24	1,266.50	1,646.45
"	35,461	137.3	178.49	2,434.39	3,164.70
No. 1.	10,483	3,617.2	4,702.36	18,959.55	24,647.41
"	6,495	3,617.2	4,702.36	11,746.85	15,270.90
No. 2.	2,982	1,361.2	1,769.56	2,029.54	2,638.40
"	14,990	684.1	889.33	5,127.32	6,665.51
	778,468½			388,184.73	\$504,640.13

It is, of course, to be remembered that the values just given do not represent the amount realized for the ore. Both at Newark and Wyandotte the smelters only guaranteed to return 95 per cent. of the silver contents, and charged \$100 per ton for smelting. Besides the above ore there was produced in 1870-71 another parcel of five tons, which, with many lives, was lost on board the propeller Coburn, on Lake Huron, in October, 1871.

The total production of Silver Islet from the discovery till the close of navigation, 1871, was as follows:

	Weight, lbs.	Value per ton.	Total value.
Under Montreal Mining Company, . . .	27,073¾	\$1,646.80	\$23,115.35
Under new proprietors, 1870,	155,543	1,175.80	92,153.23
Under new proprietors, 1871, Newark, . . .	183,453	1,507.64	138,291.88
Under new proprietors, 1871, Wyandotte, . . .	778,468½	1,296.48	504,640.13
Lost on propeller Coburn,	10,000	1,040.00	5,200.00
	1,154,537½	\$1,322.44	\$763,400.59

Mining was continued with varying success after the close of navigation in 1871. The vein was found to be subject to frequent and sudden changes, both as regards size and richness. In the fall of 1871 it narrowed down to six inches in width at some points, with scarcely any first quality ore in sight. During the winter it gradually widened and became very productive. In Mr. Frue's reports many such alternations are recorded. He says that in the summer of 1872 "the lode became broken up, being thoroughly mixed with diorite and wedges of plumbago, and in the fall the mine assumed anything but a flattering appearance." Mr. Frue writes further on this subject as follows: "In the following winter it suddenly changed in character and produced, up to May 1st, 1873, 250 tons of rich

packing ore, worth about \$1500 to the ton. During May and the early summer the vein disappeared almost entirely, being broken up into strings and feeders. Later, however, there was a decided improvement, which was again overshadowed by a passing cloud, and although in extending the drift north on the forty a very promising show of silver had been opened, I had often seen the mine clothed in richer apparel than it appeared in at the close of navigation" (1873).

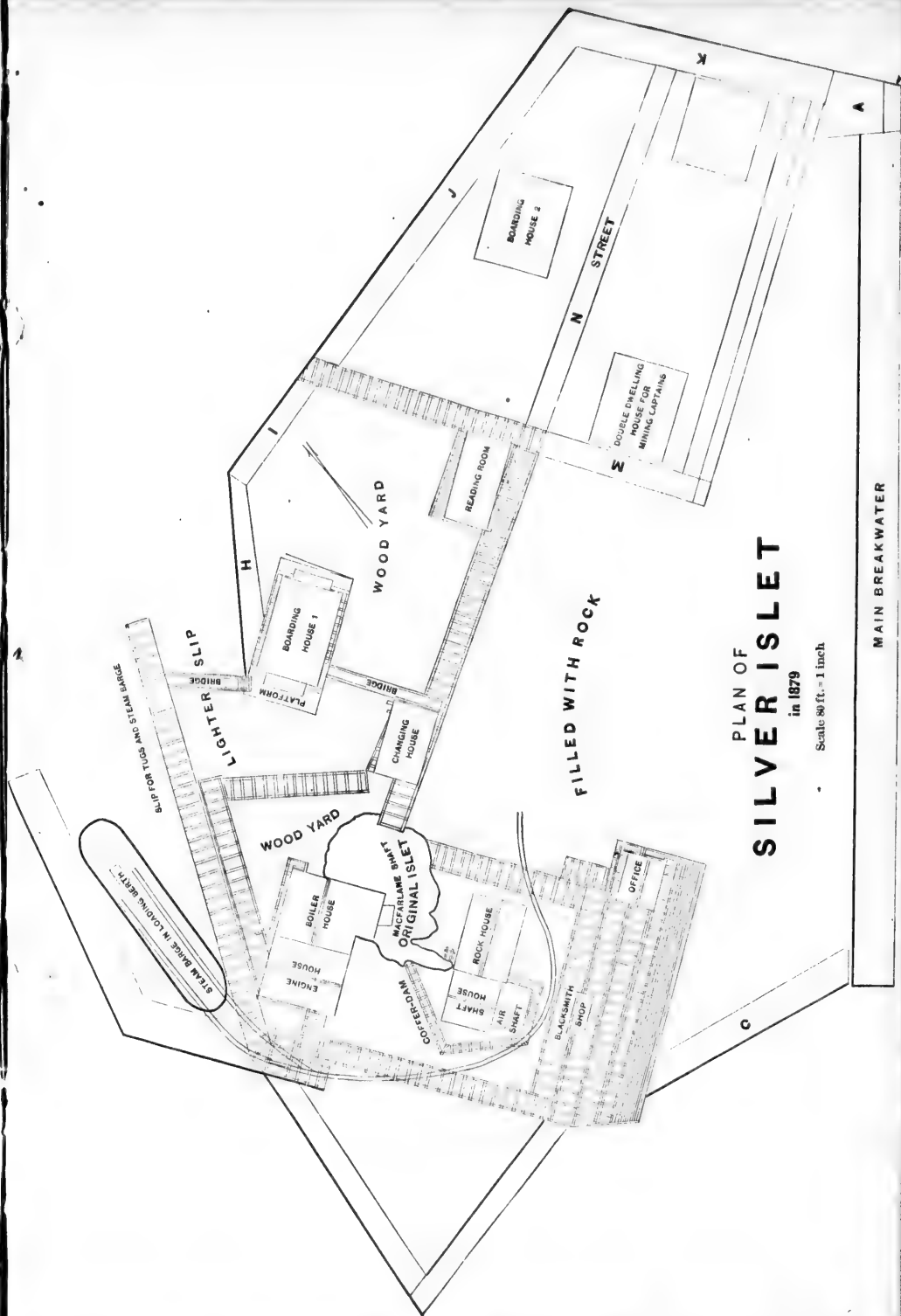
The severe storms which marked the winter of 1870-71 put in an appearance again in that of 1873-74. "About the middle of November," Mr. Frue reports, "we were visited by a heavy storm from the southeast, which did considerable damage, amounting in all to about \$2000. On December 1st we were again overtaken by a southeaster which came on in terrible fury and seemed, for a time, as though it would sweep everything before it. It tore away nearly 350 feet in length of submerged cribs, and caused a loss of 20,000 feet of timber, 7½ tons of bolts, and nearly 5000 tons of rock" (used in loading the cribs), "the total destruction amounting to a little over \$9000, besides the carrying away of the upper portion of the main breakwater. This work had an altitude of nearly twenty feet above the level of the lake. Eight feet in height of the top, and nearly sixty feet in length of it was carried away, the breach being directly in the centre. The blacksmith's shop, which stood inside of this breakwater and about forty feet from its outer face, was completely demolished. In fact, rocks were whirled around the Islet like hailstones, and a number of buildings were damaged to a considerable extent." The situation of the works protecting the mine will be seen from the accompanying plan of Silver Islet in 1879.

The ore produced from 1874 to 1875, inclusive, was treated at the Wyandotte Works and contained the following quantities of silver:

Season of 1872,	310,744.02 ounces.
" 1873,	289,763.77 "
" 1874,	250,021.75 "
" 1875,	145,902.50 "
	<hr/>
	996,432.04 ounces.

At \$1.20 per ounce the value of this product amounts to \$1,195,718.45.

Part of the product of 1875 was in the shape of concentrates from the stamp mill, which had been built at a cost of \$90,000 for treating the veinstone of inferior quality which had previously been laid aside



as too poor for shipment. This mill has 50 stamps and 12 Frue vanning machines, and produced about 1 ton of concentrates from 50 tons of the poor veinstone. The following statement gives the quantity of this ore stamped, and the concentrate produced from May, 1875, to November, 1876:

Month.	Tons rock stamped.	Product in concentrates. Tons. Lbs.	Total ounces of silver contained in same.	Total cost of dressing.
May, 1875,	541	11.1454	10,210	\$1,237.69
June, "	1,065	25. 212	17,552	2,049.89
July, "	1,079	28. 104	19,125	2,427.33
August, "	762	20.1100	11,238	2,302.78
September, "	1,505	35. 182	17,804	2,990.85
October, "	1,678	37. 843	14,415	2,840.15
December, "	1,642	31. 847	11,548	3,172.26
January, 1876,	1,556	30.1824	15,990	3,089.96
February, "	1,421	28.1812	16,346	2,944.89
March, "	1,690	32. 651	15,754	3,238.60
April, "	645	10.1475	4,806	1,788.83
May, "	1,673	33. 583	9,614	3,036.62
June, "	1,565	33.1288	10,504	2,891.36
July, "	1,525	41. 978	11,757	2,768.47
August, "	1,600	33.1591	9,527	2,833.04
September, "	1,505	33.1232	10,060	2,807.17
October, "	1,500	38.1835	9,234	2,596.26
November, "	1,494	29. 194	11,389	3,093.93
	24,446	541,373	226,873	\$48,145.08

These figures show that 9.28 ounces per ton were extracted from the stamp rock and concentrated in a product containing 418 ounces per ton, at a cost of \$1.97 on the original ore.

The unfavorable changes in the Silver Islet vein, which occurred in the fall of 1873, continued up to the close of 1876. The new levels which had been opened up, the eighth and ninth, proved wholly unproductive, although no difficulty was experienced in following and working on the vein. A vast amount of exploratory work by means of the diamond drill also failed to discover any deposits of rich ore. The consequence was, of course, great financial embarrassment and an almost entire cessation of work during the summer of 1877. In August of that year work was resumed, and up to December 23,850 ounces of silver obtained by stoping in the upper part of the mine. It was even proposed to remove the rich ground lying betwixt the mine and the lake, substituting for it an artificial arch; but, fortunately, in the summer of last year a bunch of rich ore was struck beneath the fourth level, south of the shaft, which in a few months yielded 721,632 ounces of silver, a quantity amply

sufficient to rescue the mine from all its embarrassments and provide a reserve or working capital of \$300,000.

I have not found it possible to ascertain the amount of the product, year by year, subsequent to 1875, but according to information received from C. E. Trowbridge, Esq., Secretary of the Silver Islet Company, there have been extracted since the commencement of operations, in September, 1870, and up to the close of navigation in 1878, 2,174,499½ ounces refined silver, with a value of \$2,921,727.24. If to this we add the value of the ore obtained immediately after the discovery by the Montreal Mining Company, we have a total yield of \$2,948,019.81. With regard to the production of the present year, it consists almost exclusively of concentrates, but its value is very certain to exceed \$50,000, and I think that at the end of the season the total yield of Silver Islet mine since its discovery will be found to have reached three million dollars.

The question of the future of Silver Islet mine is one of very great interest to many besides those pecuniarily concerned. When visiting the mine, in July, 1877, the vein appeared perfectly well defined on the ninth level, but nothing in the shape of ore was to be seen. The vein was said to possess the same character in the inclined shaft sunk 100 feet deeper than the level, and to a point about 640 feet from the surface. This shaft was filled with water at the time of my visit. The vein below this point has been tested by a drill-hole 296 feet deep, in which traces of silver ore were detected. Even if we suppose that this trace is the clue to another *bonanza*, the fact still remains that from the 6th level to the deepest working, a distance of 300 feet, the vein has been found to be unworthy of excavation, and this too in spite of the presence of diorite on both walls, a condition which, when the mine was first opened, was supposed to insure a remunerative vein. In view of this fact and of the circumstance that the recent rich discovery was made at a point where only the foot-wall could have been diorite, it becomes a question whether the theory of the beneficial influence of diorite walls is correct. If it is, then a large amount of vein area below the 5th level and to the north of the shaft remains to be prospected. That this ground has, so far, been found barren may be owing to the peculiar nature of the vein, in which large values of ore seem to be stowed away in comparatively small space. If the theory here referred to is unfounded, and the vein in the adjoining flags and shales be really as promising as that crossing the diorite, then the amount of ground available for exploration, north and south of the mine, is immense. As a matter

of fact, the horizontal strata, elsewhere in the district, have been found to contain silver-bearing veins, but, so far, have failed to afford foundation for a remunerative mine. In either case the future of Silver Islet mine depends mostly on the carefulness of the manager and his assistants in detecting minute traces of ore, and their skill and perseverance in following them. It would seem altogether unwise to depend upon any preconceived notion as to the manner in which the valuable minerals occur, or ought to occur, in the mine, for it must be confessed that hitherto the chemical geologist has rendered but very slight assistance to the practical miner in his search for the remunerative parts of a vein. The best guarantee for the future is in the past history of the mine, which proves that rich deposits may be stumbled upon quite unexpectedly in the ground already opened up.

I obtained from Edward Learned, Esq., President of the Silver Islet Company, whose faith and perseverance has carried the company through many of its difficulties, the original of the panoramic sketch, published herewith, of Silver Islet and the adjacent islands and mainland. It is exceedingly truthful, and will serve to give some idea of the situation of this remarkable mine. The artist is Mr. George Snell, of Boston.

I have thus endeavored to record the principal facts which have come to my knowledge regarding this extraordinary silver vein. Its story ought to teach Canadians, among other things, to have more confidence in the mineral resources of their country. That over three millions have been extracted from a bare rock, in Lake Superior, with an area not exceeding a thousand square feet, ought to increase our faith in the vast unexplored regions which stretch away to the north and northwest of us. But let us not, in the event of new discoveries, pamper our worthless mines, nor, on the other hand, starve those of good promise. Neither let us, when we find another productive mine, tear out recklessly all the ore in sight. The product of a mine, like that of a farm, cannot be forced beyond certain proper limits without bad consequences. Let reserves accumulate in our mines as the "rests" formerly did in our financial institutions, and mining will become as profitable as banking, if not more so. The opposite system, "picking the eyes out of the mine," *Raub bau*, as the Germans call it, has caused the ruin of such mines as the Ophir in Nova Scotia, and the Acton in Quebec. It is "more by good luck than good guiding" that a similar fate has not yet overtaken Silver Islet in Ontario.

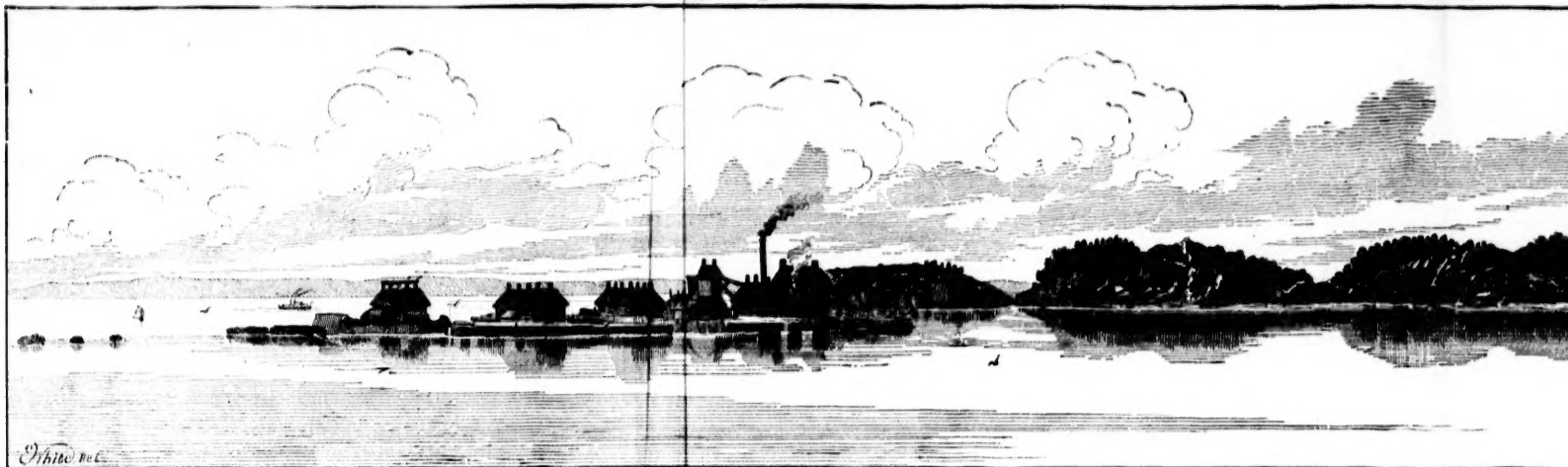
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VER ISLET LANDING).
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SILVER ISLET.
Isle Royale in the distance.

SHANGOINAH I



BURNT ISLAND.

SILVER ISLET AND VICINITY, FROM



SHANGOINAH ISLAND.



ISLAND.

MAINLAND (SILVER ISLET LANDING).

With Pie Island in the distance.

T AND VICINITY, FROM THE EAST.